

CLAIMS

1. A honeycomb filter for purifying exhaust gases which has a structure in which:

5 a plurality of a columnar porous ceramic member are combined with one another through adhesive layer, each of said columnar porous ceramic member comprising a number of through holes that are placed in parallel with one another in the length direction with partition wall interposed therebetween; and
10 said partition wall which separates said through holes functions as a filter for collecting particulates
wherein

the relationship between a thermal expansion coefficient α_L of said adhesive layer and a thermal expansion coefficient
15 α_F of said porous ceramic member is as follows:

$$0.01 < |\alpha_L - \alpha_F|/\alpha_F < 1.0.$$

2. A honeycomb filter for purifying exhaust gases which has a structure in which:

20 a coating material layer is formed on the circumferential face of a ceramic block which comprises at least one of a columnar porous ceramic member,

each of said columnar porous ceramic member comprising a number of through holes that are placed in parallel with one
25 another in the length direction with partition wall interposed therebetween; and

said partition wall which separates said through holes functions as a filter for collecting particulates

wherein

30 the relationship between the thermal expansion coefficient α_M of the coating material layer and the thermal expansion coefficient α_F of the porous ceramic member are as follows:

$$0.01 < |\alpha_M - \alpha_F|/\alpha_F < 1.0.$$

3. A honeycomb filter for purifying exhaust gases which has a structure in which:

a plurality of a columnar porous ceramic member are combined with one another through adhesive layer to constitute

5 a ceramic block,

a coating material layer is formed on the circumferential face of said ceramic block

each of said columnar porous ceramic member comprising a number of through holes that are placed in parallel with one 10 another in the length direction with partition wall interposed therebetween; and

said partition wall which separates said through holes functions as a filter for collecting particulates

wherein

15 the relationship between the thermal expansion coefficient α_L of the adhesive layer and the thermal expansion coefficient α_F of the porous ceramic member are as follows:

$0.01 < |\alpha_L - \alpha_F| / \alpha_F < 1.0$, and

20 the relationship between the thermal expansion coefficient α_M of the coating material layer and the thermal expansion coefficient α_F of the porous ceramic member are as follows:

$0.01 < |\alpha_M - \alpha_F| / \alpha_F < 1.0$.

25 4. A honeycomb filter for purifying exhaust gases which has a structure in which:

a plurality of a columnar porous ceramic member are combined with one another through adhesive layer, each of said columnar porous ceramic member comprising a number of through 30 holes that are placed in parallel with one another in the length direction with partition wall interposed therebetween; and

said partition wall which separates said through holes functions as a filter for collecting particulates

wherein

35 the adhesive layer has a thermal capacity per unit volume

that is lower than the thermal capacity per unit volume of the porous ceramic member.

5. The honeycomb filter for purifying exhaust gases according to claim 4,

wherein

the thermal capacity per unit volume of the adhesive layer is set to 90% or less of the thermal capacity per unit volume of the porous ceramic member.

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6. The honeycomb filter for purifying exhaust gases according to claim 4 or 5,

wherein

15 the thermal capacity per unit volume of the adhesive layer is set to 20% or more of the thermal capacity per unit volume of the porous ceramic member.

7. An adhesive comprising:

a material that is capable of forming independent pores.

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8. The adhesive according to claim 7,

wherein

25 the material that is capable of forming independent pores is made from at least one material selected from the group consisting of a foaming agent, inorganic balloons and organic balloons.

9. A honeycomb filter for purifying exhaust gases which has a structure in which:

30 a plurality of a columnar porous ceramic member are combined with one another through adhesive layer, each of said columnar porous ceramic member comprising a number of through holes that are placed in parallel with one another in the length direction with partition wall interposed therebetween ;and
35 said partition wall which separates said through holes

functions as a filter for collecting particulates
wherein

the adhesive layer is made of the adhesive according to
claim 7 or 8.

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10. A honeycomb filter for purifying exhaust gases which has
a structure in which:

10 a coating material layer is formed on the circumferential
face of a ceramic block which comprises at least one of a columnar
porous ceramic member,

each of said columnar porous ceramic member comprising
a number of through holes that are placed in parallel with one
another in the length direction with partition wall interposed
therebetween; and

15 said partition wall which separates said through holes
functions as a filter for collecting particulates
wherein

20 the coating material layer has a thermal capacity per unit
volume that is lower than the thermal capacity per unit volume
of the porous ceramic member.

11. The honeycomb filter for purifying exhaust gases according
to claim 10,

wherein

25 the thermal capacity per unit volume of the coating
material layer is set to 90% or less of the thermal capacity
per unit volume of the porous ceramic member.

12. The honeycomb filter for purifying exhaust gases according
30 to claim 10 or 11,

wherein

the thermal capacity per unit volume of the coating
material layer is set to 20% or more of the thermal capacity
per unit volume of the porous ceramic member.

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13. A coating material comprising
a material that is capable of forming independent pores.

14. The coating material according to claim 13,
5 wherein
the material that is capable of forming independent pores
is made from at least one material selected from the group
consisting of a foaming agent, inorganic balloons and organic
balloons.

10 15. A honeycomb filter for purifying exhaust gases which has
a structure in which:
a coating material layer is formed on the circumferential
face of a ceramic block which comprises at least one of a columnar
15 porous ceramic member,
each of said columnar porous ceramic member comprising
a number of through holes that are placed in parallel with one
another in the length direction with partition wall interposed
therebetween

20 wherein
said coating material layer is formed by using the coating
material according to claim 13 or 14.

16. A honeycomb filter for purifying exhaust gases which has
25 a structure in which:
a plurality of a columnar porous ceramic member are
combined with one another through adhesive layer to constitute
a ceramic block,
a coating material layer is formed on the circumferential
30 face of said ceramic block
each of said columnar porous ceramic member comprising
a number of through holes that are placed in parallel with one
another in the length direction with partition wall interposed
therebetween; and

35 said partition wall which separates said through holes

functions as a filter for collecting particulates
wherein

the thermal capacity per unit volume of the adhesive layer
and the thermal capacity per unit volume of the coating material
5 layer are lower than the thermal capacity per unit volume of
the porous ceramic member.

17. The honeycomb filter for purifying exhaust gases according
to claim 16,

10 wherein

each of the thermal capacity per unit volume of the adhesive
layer and the thermal capacity per unit volume of the coating
material layer is set to 90% or less of the thermal capacity
per unit volume of the porous ceramic member.

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18. The honeycomb filter for purifying exhaust gases according
to claim 16 or 17,

wherein

each of the thermal capacity per unit volume of the adhesive
20 layer and the thermal capacity per unit volume of the coating
material layer is 20% or more of the thermal capacity per unit
volume of the porous ceramic member.

19. A honeycomb filter for purifying exhaust gases which has
25 a structure in which:

a plurality of a columnar porous ceramic member are
combined with one another through adhesive layer to constitute
a ceramic block,

30 a coating material layer is formed on the circumferential
face of said ceramic block

each of said columnar porous ceramic member comprising
a number of through holes that are placed in parallel with one
another in the length direction with partition wall interposed
therebetween ; and

35 said partition wall which separates said through holes

functions as a filter for collecting particulates
wherein

the adhesive layer is formed by using the adhesive
disclosed in claim 7 or 8, and the coating material layer is
5 formed by using the coating material disclosed in claim 13 or
14.

20. The honeycomb filter for purifying exhaust gases according
to claim 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 15, 16, 17, 18 or 19,
10 wherein
a catalyst is supported.

21. A manufacturing method of
a honeycomb filter for purifying exhaust gases which has a
15 structure in which:

20 a plurality of a columnar porous ceramic member are
combined with one another through adhesive layer to form a ceramic
laminated body, and said ceramic laminated body is subjected
to a machining process to constitute a ceramic block,
said ceramic block having a filled layer formed on the
circumference part thereof

25 each of said columnar porous ceramic member comprising
a number of through holes that are placed in parallel with one
another in the length direction with partition wall interposed
therebetween; and

said partition wall which separates said through holes
functions as a filter for collecting particulates

30 which comprises steps of:
the coating material filling step, in which
assuming that a border line formed by an end face of a
ceramic block to be manufactured is superposed on an end face
of said ceramic laminated body formed by combining a plurality
of the porous ceramic members with one another through the
35 adhesive layer,

the through holes of the porous ceramic member that crosses the border line is filled with a coating material; and the ceramic block manufacturing process, in which the ceramic laminated body filled with said coating 5 material is subjected to a machining process so that a ceramic block is manufactured.